

NOTES ON AFRICAN CHALCIDOIDEA.—I.

By JAMES WATERSTON, B.D., B.Sc.,

Imperial Bureau of Entomology, London.

The following descriptions are based on material submitted by various collectors to the Imperial Bureau of Entomology. The types of the new species will be deposited in the British Museum.

Family AGAONIDAE.

In an interesting series of Fig Insects, comprising both caprifigers and inquilines, which have been forwarded by Dr. G. D. H. Carpenter from Uganda, are two species belonging to this family and representing respectively its main divisions.

The Sycophagine species appears to demand a new genus for its reception. Amongst its many noteworthy features, the most remarkable is the extreme development of the sub-apical spur of the first tibia into an organ comparable with the appendage to the mandibles so characteristic of the Agaonines.

For this new genus, the name *Sycoecus* (σῦκον, οἶκος) is proposed. *Sycoecus* affords a really extraordinary instance of homoplasy. The tibia is externally furnished with heavy, tooth-like spines, which, in conjunction with the flattened, small process, form a digging apparatus exactly similar to the mandible and appendage of *Pleistodontes*, etc. In these instances, therefore, the two sub-families have adopted the same device, but by modifying different organs. The tissue of the ovary, etc., of the fig is probably first dug into and torn by the teeth and then cut and swept aside by the lamina, which is in each case movable horizontally.

Both the Sycophagine (a few) and the Agaonine (very plentiful) occurred in the same species of fig, and sometimes together. There can, I think, be no doubt that the Agaonine species belongs to the genus *Agaon*, Dalm. (1818), about which little appears to be known at first hand. Dr. Carpenter's specimens may even be *A. paradoxum*, Dalm. (Svensk. Vet-Akad. Handl., xxxix, p. 69, 1818), but the thorax appears to be longer than in the genotype, while the petiole and first abdominal segment are maculate or banded. The original description is insufficient for specific determination. Having unsuccessfully tried to view the type, I have thought it better, meanwhile, to separate the Uganda examples from the Sierra Leone species.

Ashmead's table (Mem. Carn. Mus., i, no. 4, p. 233, 1904) should be corrected. In *Agaon* the head is less than $2\frac{1}{2}$ times as long as broad; the antennae have 11 not 12 joints; the third joint shows a distinct process, and the mandibles have 4 and not 3 teeth. *Agaon* appears to be most closely related to *Pleistodontes*, Saund. (Trans. Ent. Soc. Lond., 1883, p. 8), but the latter genus differs conspicuously in the antennae and legs.

***Agaon fasciatum*, sp. nov. (figs. 1 and 2).**

General colour pale yellow-brown, with darker head and sheath of ovipositor, first tergite with a medianly interrupted dark band.

♀. *Head* flattened greatly, $1\frac{1}{2}$ – $1\frac{3}{4}$ times as long as broad. Eyes reaching vertex, rather less than one-half length of head, placed mainly at the side and widely apart.

Vertex V-shaped, the sides clothed with short hairs ; frons with sharp median sulcus, the sides contiguous to one-third from vertex, widening thence to scrobes, V-shaped in transverse section, with scattered short hairs except behind the scapes. Clypeus produced in a rounded median projection, between which and the scrobes are many short, stiff hairs. Antennae (fig. 1) 11-jointed, set at less than one-fourth from mouth edge ; scrobes widely apart, narrow, slanting inwards and upwards, face triangularly excavated from this level to the edge of the clypeus ; scapes large, opposed to one

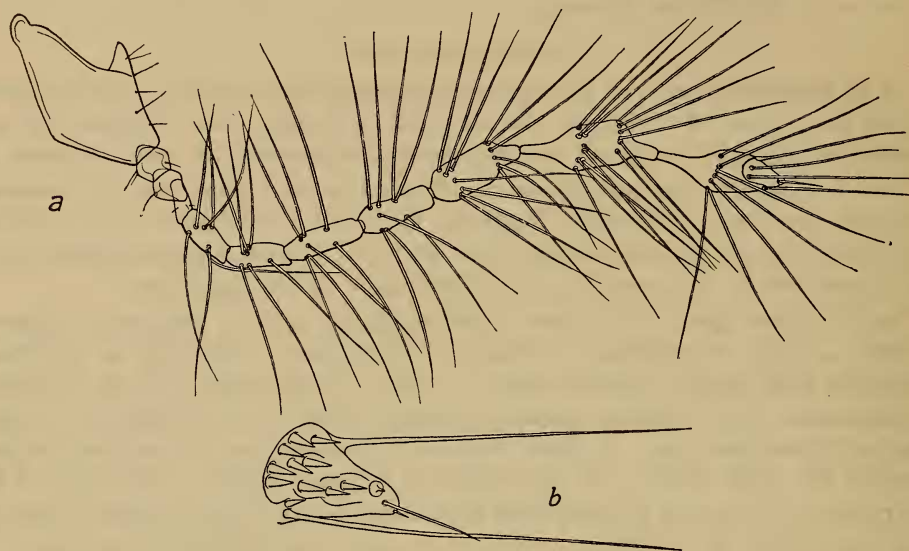


Fig. 1. *Agaon fasciatum*, sp. nov. ; a, antenna ; b, terminal sense-organ.

another along their much flattened triangular faces, with (at about one-half) a strong outwardly-directed process, which bears six short bristles ; second joint transverse, short, with six bristles ; third joint flat and round basally, thereafter drawn out apically to a sharp point, with one short, stout bristle ; 4th joint cylindrical, short, rising from a depression in the third near the base, having 3 short bristles. Joints 5-8 (of which 5 and 6, and 7 and 8 respectively, are subequal) are similarly built ; each bears near the base five or six very long tubular bristles and one or two more near the apex ; 9 is half as wide again as 8 and bears 2 rows of the long bristles, as do 10 and 11 ; it is apically produced into a neck ; 10 is produced into a neck in both directions ; the 11th segment bears a sense organ composed of about ten short leaf-like hairs.

Mouth-parts (fig. 2, a, b).—Mandibles powerful, symmetrical, with 4 teeth on inner edge ; one pair (apical and sub-apical) are equal, a third behind them shorter, a fourth small, with sometimes a trace of another behind. Under surface of the mandible with over a dozen sharp ridges ; on the inner superior angle there is a strong broadened process for muscle attachment. Hinged to the mandible, but not interfering with its mobility, is a very long, backwardly directed and apically slightly outcurved rasping blade, reaching to the occiput. This appendage breaks easily from the mandible ;

it is sharply serrate on the outer edge, and less distinctly so on its inner aspect; the lateral serrations are the terminal units of parallel rows (about 50) of teeth, numbering 15–20 per row. Maxilla laterally compressed and appearing like a blade between the saws attached to the mandibles; stipes in the form of a long, narrow strip (6:1), broadest near the apex; galea with two bristles; palpus entirely absent. Labium like a laterally compressed (5:1) spoon; palpi not certainly present; in their place and possibly homologous with them are two approximated slightly raised clear spots which give rise to a bristle; two minute distal bristles.

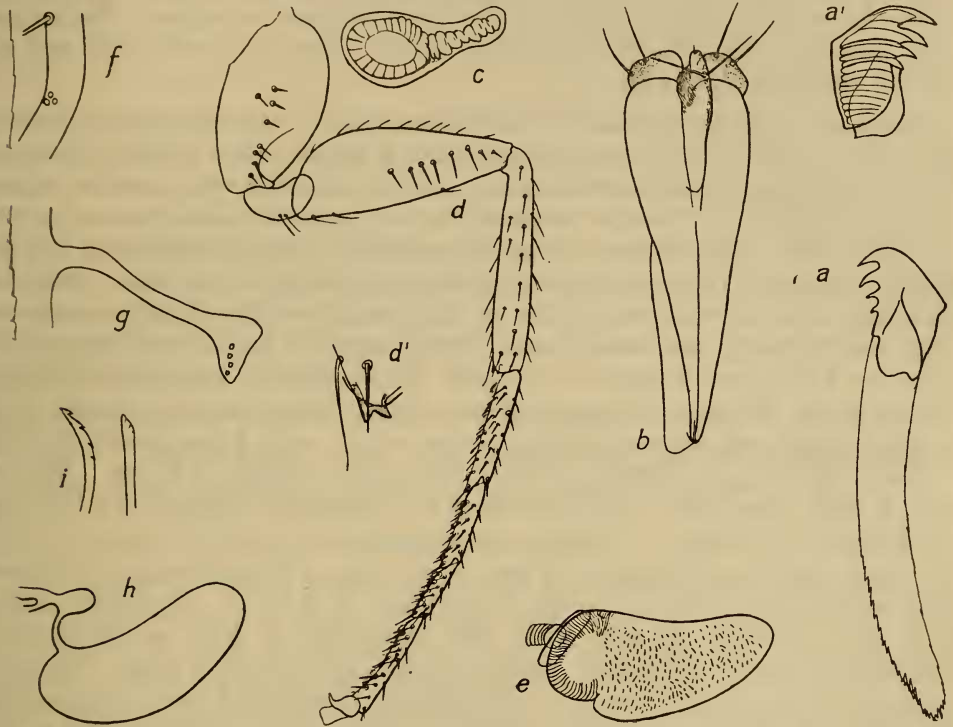


Fig. 2. *Agaon fasciatum*, sp. nov.; a, mandible and serrate appendage; a', mandible, under surface; b, trophi; c, metathoracic stigma; d, hind leg; d', apex of hind tibia; e, caudal stigma; f, cells at junction of submarginal and marginal veins; g, radius; h, receptaculum seminis; i, apex of ovipositor.

Thorax.—Noteworthy in this region are the reduction of the pronotum, the development of the prothoracic spiracle, the mesonotum and the propodaeum. Pronotum short, angularly emarginate behind, consisting of two triangular sclerites connected by a narrow, membranous area. On each triangle there is an irregular row of bristles along the inner edge, a few more on the outer, and one or two on the surface near the posterior angle. Prothoracic spiracle with a strong, terminal chitinous cap, which, along with part of the trachea, projects clear of the side; this structure and the tegula are probably the two thorns or spines with which Dalman says his insect is provided on the sides of the thorax. Mesonotum triangular before the suture, coming to a point anteriorly in the middle of the prothorax; no definite parapsidal furrows; 4–6 short bristles posteriorly, on each side of an incomplete median line.

Tegulae conspicuous. Axillae bare, externally rectangular. Scutellum with a median impressed triangular area; over 20 short bristles in two irregular rows before the suture and mainly inside the triangle. Metanotum distinct, ribbon-like; the posterior margin broadly excised in the middle, with 4-6 minute bristles at each side. Propodaeum similar to the metanotum, but about twice as broad. Spiracle oval, with the anterior end narrower and debouching on a distinct stalk or ridge, so that the whole structure is pear-shaped (fig. 2, c); 5 short bristles behind the spiracle. Mesophragma long, narrow and distinctly entering the abdominal cavity. Prosternum diamond shaped, slightly truncate anteriorly, while the posterior angle is bifid and free from the thoracic surface. Mesosternal area anteriorly concave, with a strong median ridge, and posteriorly with six minute bristles on each side.

Abdomen.—Petiole very broad and dark, almost coextensive with the propodaeum. The abdomen conic-ovate and compressed, with V-shaped hollow on basal segments. First tergite almost unchitinised medianly, dark at the sides, with about 30 minute bristles on each side. The other tergites bare, but nearer the spiracle are one or two minute bristles. Spiracle (fig. 2, e) more than twice as long as broad, with a sharp narrow indentation on the lower proximal edge at one-fourth from base. Sternites with the chaetotaxy obsolescent, but on the ploughshare-shaped fifth sternite are some short hairs in two ventral rows. Stylet narrow; longer on the upper edge, where are 4 hairs, and 2 others at the apex. The ovipositor is from three-fourths to as long as the abdomen; the piercing part slightly longer than the sheath, which is black, edged with scattered bristles; apex of saw with 2 strong teeth (fig. 2, i).

Wings (fig. 2, f, g).—Forewing, length, 2.5 mm.; breadth, 1.1 mm. Hyaline, with a slight cloud below the upturning of the submarginal vein and in a line from the frenulum to the base. There are three faint venae spuriae from the end of the radius and two others from the base of the wing. The submarginal, marginal, postmarginal and radius are in the proportion:—8:3:5:2. Hindwing, length, 1.35 mm.; breadth, .25 mm., with cilia nearly half as long as the breadth; remarkably long in proportion to the breadth, with rounded apex. Hooks of retinaculum on a distinct elevation. Submarginal vein broad basally, but tapering off before the hooks at about three-fourths. Colour clear, slightly clouded at the end of the single vein.

Fore legs.—Coxae compressed, $2\frac{1}{2}$ times as long as broad; 6-8 bristles along anterior edge, chiefly on anterior two-thirds; bare externally, save on the upper or basal posterior third, where are 6-9 short spines; on the posterior edge and along the adjacent inner aspect, especially on the basal third, are numerous soft hairs; on the inside also are 3 longer apical bristles. Trochanter short, with 4-5 ventral bristles. Femur one-third longer than coxa, narrow on basal half, then expanded; greatest width one-fourth the length; on the outer surface are about a dozen bristles, which increase in length towards the apex; on the apical ventral region are numerous scattered hairs, besides a few on the anterior edge and a regular row (short) on or near the ventral. Tibia one-third of the femur in length; $2\frac{1}{2}$ times as long as broad, with 2 short stout outer apical spines, one dorsal, the other ventral; many strong scattered bristles on the outer aspect and a few on the inner; the pre-apical ventral bristle not stoutly developed. Tarsus nearly thrice

as long as the tibia (14 : 5) and equal to the femur ; proportional length of joints :—65, 17, 30, 20, 40 (excluding claw). *Mid legs* slender. Mid coxae narrowed basally, with straight anterior edge and rounded posteriorly ; $\frac{1}{2}$ longer than broad ; 6–10 short bristles on each edge. Trochanter nearly equal to the coxa (23 : 25), with one sub-apical ventral bristle. Femur 5 times as long as broad, with subparallel sides ; along anterior edge about 12 short bristles, on outer surface 10 bristles, the line curving upwards near the apex, 3–4 ventral bristles on basal third, and one longer preapical hair on inner median surface. Tibia considerably larger than femur, with numerous bristles, especially on the edges. Tarsus equal to the tibia ; proportions of joints :—50, 43, 30, 25, 35. *Hind legs* (fig. 2, *d*).—Coxae large, pear-shaped, three-fifths as broad as long ; a longitudinal median row of 4 short stout hyaline spines and a few bristles on the apical half of the inner surface. Femur only one-sixth longer than the coxa, considerably expanded dorsally ; on basal third about 8 bristles in a ventral row and many along the dorsal or posterior edge and on the adjacent outer surface ; beginning at one-third from the base on the inner surface is a row of 6–8 stout spines similar to those on the coxa. Tibia equal to the femur, slightly expanded distally, with numerous hairs and bristles, those on the outside chiefly in a submedian row, near the apex on the inside one or two are stronger ; on the outside at the apex is a very short, heavy, bifid projection. Tarsus much longer than either femur or tibia ; the first joint exceedingly bristly ; proportion of joints :—75, 55, 50, 32, 50.

Length (excluding ovipositor), 3 mm. ; alar expanse, 5.5 mm.

UGANDA : Bugalla Island, Sesse, Lake Victoria, Sept. 1912 (*G. D. H. Carpenter*).

A series taken from an unopened wild fig (*sp. nondum det.*).

SYCOECUS, gen. nov.

♀. Antennae 11-jointed, inserted just below the middle of the face ; the scape long and slender ; pedicel short, followed by two ring joints ; first funicular joint much expanded, joints 6–8 cylindrical, the last expanded distally ; club of three segments. Head as a whole very long, mandibles powerful ; labial and maxillary palpi present, with 2 and 4 joints respectively. Thorax much depressed, with very long pronotum. Wings with all the veins developed, the radius long. Fore legs with robust femora and shortened, heavily-armed tibiae ; mid and hind legs normal in structure, the hind tibia longer than the femur. Abdominal tergites with narrow slit-like emarginations ; the last spiracle circular ; stylet narrow, distally expanded (fig. 3, *d*).

Sycoecus thaumastocnema, sp. nov. (figs. 3 and 4).

♀. *Head* greatly flattened, much longer than broad (5 : 3) ; from the insertion of the antennae to the vertex runs a broad depression, at the bottom of which are two narrow diverging furrows for the reception of the scapes ; scrobes broadly oval, flattened on the inside. The ocelli are on different planes—viz. : a pair on the vertex (which owing to the shape and position of the head is hardly separable from the occiput) and a single median one on the frons above the scapes. Vertex exceedingly narrow, raised in a median rounded prominence, bearing on each side a short, stiff bristle ; 3 bristles (of which the median is the longest) at each corner

of the vertex above the eye. Eye glabrous, touching the vertex at its upper angle ; in proportion to the rest of the head small, occupying only about one-third of the length and less than one-fourth of the breadth, *i.e.*, the distance between the eyes is greater than their combined breadth ; the head, moreover, is so flat that the greater part of the eye lies on the dorsal or morphologically frontal aspect. Head produced below the eyes, with one, and after an interval 4 hairs at the side ; a

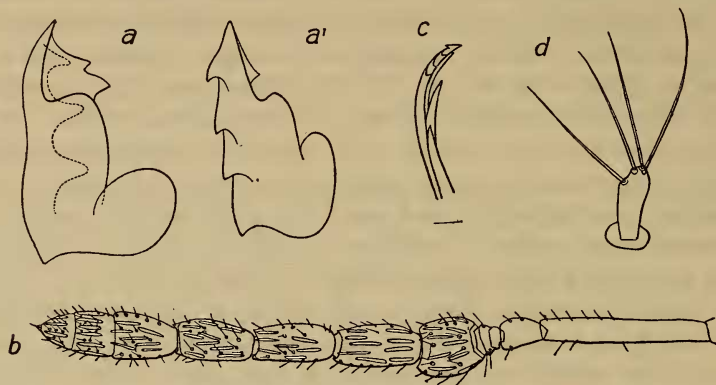


Fig. 3. *Sycoecus thaumastocnema*, sp. nov. ; *a*, mandible, from above ; *a'*, mandible, side view ; *b*, antenna ; *c*, apex of ovipositor ; *d*, stylet.

number of excessively minute bristles on the upper surface, irregularly disposed, but more numerous towards the mouth edge. Clypeus with the lateral angles reduced and rounded, its apical margin just slightly entrant, then produced into two broad lobes with a considerable incision between. Antennae (fig. 2, *b*) with the scape long and slender (6 : 1), with sub-parallel sides ; pedicel short, expanded distally ; two ring joints, closely united, the first minute ; the first joint of the funicle (5th) is the broadest in the antenna, the breadth being nearly equal to the length ; the sides strongly convex, joints 6 and 7 cylindrical, subequal and twice as long as broad ; the eighth shorter, a little expanded distally ; the club consists of three divisions, of which the first is the longest, the last joint showing a minute apical darker point, which can hardly rank as a joint. There appears to be no special apical sense organ, unless indeed the region just referred to be such ; joints 5–11 bear numerous hairs and longitudinal sensory channels terminating apically in sharp points of clear chitin, raised a little from the segment surface to form a crown at the suture.

Mouth-parts.—Mandibles (fig. 3, *a*) powerful, on the outer aspect three strong triangular ridge-like teeth, a fourth at the apex and within two smaller sub-apical ones ; seen from above, the posterior two-thirds of the mandible is flat, consisting of two rounded lobes, by the posterior of which articulation with the clypeus is secured. Trophi (fig. 4, *d*) normally developed ; maxilla with the cardo short, stipes three times as long as broad, bare on ventral aspect, galea anteriorly incurved, with 5 straight bristles on the distal half, the apical being longest. Maxillary palpus 4-jointed (5, 5, 6, 9), third joint with one bristle, fourth with a long apical bristle and a slighter one near the base. Labium bare, palpus 2-jointed, with a minute sub-apical and a long straight terminal bristle. Lingua with 4 short stiff hairs on one-jointed tubercles.

Thorax.—Pronotum almost as long as the visible mesonotum, much produced and overlapping the mesonotum conspicuously behind; at the mid anterior edge a row of minute hairs, followed by an antemedian row of 4 bristles (the 2 central ones short) and 2 strong bristles placed post-medianly; on the overlapping sides of the pronotum there is a longitudinal row of about 7 moderately strong bristles; stigma small oval. Sternum diamond-shaped. Mesonotum parabolic, far underlapping anteriorly; parapsidal furrows distinct and broad; mid lobe bare, but on each side (just on the parapsidal furrows) are 3 bristles, the hindmost being generally the stoutest; lateral lobes with one bristle; axillae, with the outer angle a right angle, bearing one or two minute bristles, a stronger bristle on the suture with the

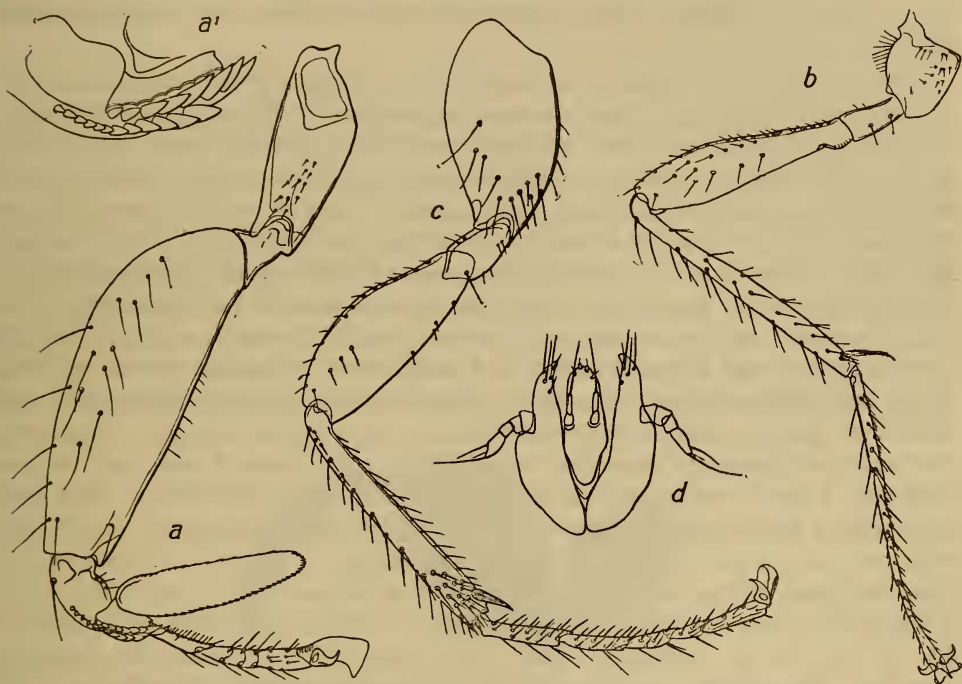


Fig. 4. *Sycoecus thaumastocnema*, sp. nov.; a, fore leg; a', spines on edge of fore tibia; b, mid leg; c, hind leg; d, trophi.

scutellum, which is bare medianly, but has two bristles on the hind edge; meso-phragma long. Mesosternum consisting of four sclerites, two anterior and wedge-shaped, the bases being outwards, and two posterior, quadrate; the wedges are bare, save for a pair of minute bristles on the middle of the anterior edge; on the quadrate area behind there is a stout short bristle on each side of the middle line, with a patch of minute bristles (about 12) outside, while posteriorly there is a median longitudinal row of similar bristles (9) reaching the hind margin. The metanotum and the propodaeum are both collar-like; the former narrow; the stigma rounded, oval, with a bristle in front.

Abdomen.—First tergite with a peculiar backward process on each side; the other tergites with up to 8 clear slit-like striae running from the posterior margin; bare, save for one or two minute hairs on each side. Spiracle nearly circular, with about

25 bristles behind. Stylet (fig. 3, *d*) distally expanded, with 4 bristles, and 2 bristles on the tergite below; about 6 bristles between the stylets. Ovipositor shortly projecting, one-sixth the length of the abdomen; the saw downwardly recurved, the apex rather stout, recurved (fig. 3, *c*); the teeth (4) circularly but faintly cut; upper sheath practically as long as the saw, broad, with two scattered rows of hairs (each 10–12); lower sheath hardly reaching base of upper, with 7–8 ventral hairs on each side.

Wings.—Forewing, length, 1.8 mm.; breadth, 8 mm.; submarginal twice as long as marginal, radius developed strongly, long and gradually expanded; four terminal cells; post marginal moderate, two-thirds the radius; basal triangle of the wing (up to about the middle of the marginal vein) bare. Hind wing, length, 1.4 mm.; breadth, .3 mm.

Fore legs (fig. 4, *a*).—Coxae more than twice as long as broad; trochanter short. Femur greatly developed; three times as long as broad, with a few scattered superficial hairs. Tibia short, thick, medianly bent and excavated, armed on the inside at the middle with an enormous rasp-like broad flat thorn or spine, which is nearly twice as long as the tibia itself and equally broad; the surface of the rasp is covered with rows (about 25) of flat scale-like teeth or spines (10–25 in a row); the edges and distal extremity are serrate and the number of teeth on the rasp is about 500; the tibia is broadest at its base, and before the median chitinous thickening it bears 7–8 hairs above, and one or two on the inside; behind the thickening there is on the upper anterior edge a double row of 7–8 short heavy triangular spines, one being apical and stronger than the others; there are also about 6 transparent stout bristles or spines on the inner or ventral apical edge behind the rasp. Tarsus with the first joint gradually expanded from base to apex, joints 2 and 4 of the same thickness, 5 again expanded; the claw robust, with two basal bristles; first tarsal joint with a ventral comb of about 9 short bristles and a subapical pair, dorsally with one hair at the middle and one pre-apical pair; joints 2–4 with one short stout subapical ventral bristle, another similar dorsal one and one at the side; joint 5 with two or three fine bristles on each aspect; proportional lengths of the joints:—40, 16, 14, 12, 35 (excluding claw). *Mid legs* (fig. 4, *b*) weak, but normal in structure. Coxa small, triangular, length (14) and breadth (13) sub-equal. The tarsus is long, just exceeding the tibia, which again is distinctly longer than the femur. Femur narrow basally, but slightly swollen on the apical two-thirds; over a dozen hairs along the upper edge, and a few more on both the outer and inner surfaces. Tibia with about 12 bristles on the upper edge, and 8 with a strong sub-apical spine below, on the outer surface a row of about 6. The tarsal joints are bristly and in the proportion 75, 45, 35, 25, 40. *Hind legs* (fig. 4, *c*) similar to mid legs, but the coxae are much larger, with a number of hairs, chiefly on the apical surface; seven-eighths the length of the femur and much broader. The tibia again exceeds the femur, and the tarsus the tibia; the sub-apical ventral spine of the tibia is short and heavy and above it is a patch of strong short bristles. Proportions of tarsal joints, 65, 45, 30, 22, 50.

Length, 3.5 mm.; alar expanse, over 4 mm.

UGANDA: Bugalla Island, Sesse, Lake Victoria (*G. D. H. Carpenter*).

A series of five specimens (all females) from an unopened wild fig.

Family CHALCIDIDAE.

Dr. Lamborn has submitted a species of *Chalcis* from Southern Nigeria differing from any hitherto described from Africa under *Chalcis* or *Oncochalcis*. It is abundantly distinct in colour, in dimensions and markings from *C. amenocles*, Walker (List. Hym. Brit. Mus. Chalcid., i, p. 84, 1846), and *C. visellus*, Walker (Ann. Mag. Nat. Hist., xvii, p. 109, 1846), both from Sierra Leone. To *C. amphiloehus*, Walker (Ann. Mag. Nat. Hist., xvii, p. 109, 1846), from the same locality, it somewhat approaches in size, but the hind tibiae of *amphiloehus* are apically lighter, the scutellum is posteriorly indented, and the first abdominal tergite closely punctate.

***Chalcis olethrius*, sp. nov. (fig. 5).**

A small coarsely punctate species distinguished by the entirely black hind femora, the pale tegulae and the rounded posterior margin of the scutellum.

♂. *Head*.—Vertex and frons coarsely punctate. Antennae inserted below the middle of the face, but distinctly above the base of the eye, with 13 joints, viz. :—scape, pedicel, one ring and 7 cylindrical joints in the funicle, and the club divided by a distinct suture at about one-third and by another, indistinct and incomplete, near the apex ; all the funicular joints broader than long, the fourth (sixth) longest, and the seventh (ninth) shortest ; the first division of the club is two-thirds the second. The antennal furrows are separated near the scrobes by a slight median keel, but united towards the anterior ocellus which the scape just fails to reach. The orbits diverge steadily from the vertex downwards, and at the point where the eyes are at their widest the diameter of each is rather less than the width of the frons.

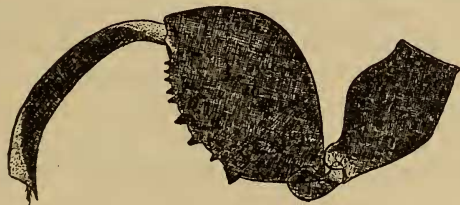


Fig. 5. *Chalcis olethrius*, sp. nov. ; hind leg (tarsus not shown).

Thorax uniformly covered above with thimble-like punctures, each having a slight central elevation bearing a bristle ; between the punctures, the surface of the thorax is rugose or reticulate. Prothorax, facing the occiput, coarsely punctate, save along a broad median line which is merely reticulate. Pronotum posteriorly narrowed by the mid lobe of the mesonotum. Mesonotum with distinct parapsidal furrows. As a guide to the degree of the puncturation of this region, it may be noted that parallel to the anterior edge of the mid lobe there are 18–20 thimble-like depressions, and on the posterior edge 6. Tegulae pale whitish yellow. Scutellum with the puncturation coarser than on any other region ; lateral and posterior bristles longer.

Fore wings, length, 2.9 mm. ; breadth, 1.1 mm.

Abdomen.—First segment covering more than half, its surface delicately reticulate, at least in the middle, but entirely shining ; second segment with all the dorsal

surface punctate (or, with good illumination, punctate reticulate, the points being faintly connected) and hence slightly dull; on segments 3-6 the punctured area is less extensive (nearly the basal third of each being clear and shining), but the punctures become progressively coarser; all the sutures between the segments shining. At the sides of all the segments are a few silvery bristles, and (except on seg. 1 and medianly on seg. 2) there is also a transverse row of bristles at the middle or a little in front of it.

Legs with all the coxae, the trochanters and the hind femora black; all the tarsi pale yellow, with a ferruginous tinge on the anterior pair; fore and mid femora black, save for a small apical yellow or yellow-brown spot above; fore and mid tibiae black, with a small basal yellow spot above, the apical fifth of each being yellow above and brownish beneath; hind tibiae black save for a long yellowish spot occupying the upper apical fourth or fifth. The hind femur bears nine teeth, 4 near the apex small, a fifth slightly larger, 6 and 7 larger, sub-equal, eighth smaller, the largest of all being at one-third from the base; about 25 short spines fringing the slanted apical edge of the hind tibia.

Length, nearly 4 mm.; alar expanse, 6-7 mm.

SOUTHERN NIGERIA: Ibadan, 3. vii. 1913 (*Dr. W. A. Lamborn*).

Host: a Tineid moth, *Pyroderces simplex*, Wlsm.; a single ♂ bred from the pupa.

There is also in Dr. Lamborn's collection a second ♂ apparently belonging to this species, which was bred from a Pyralid pupa (*Sylepta polycymalis*, Walk.) in the same locality, but both hind legs are wanting and the yellow markings of the tibiae are, if anything, more ferruginous than in the type.
